

Name: _____
PC: Vertical and Horizontal Asymptotes

Date: _____

Let r be the **REDUCED** rational function

$$r(x) = \frac{a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0}{b_m x^m + b_{m-1} x^{m-1} + \dots + b_1 x + b_0}$$

1. The vertical asymptotes of r are the lines $x = a$, where a is a zero of the denominator.

In other words:

2. (a) If $n < m$, then r has a horizontal asymptote of $y = 0$.

In other words:

- (b) If $n = m$, then r has a horizontal asymptote of $y = \frac{a_n}{b_m}$.

In other words:

- (c) If $n > m$, then r has no horizontal asymptote.

In other words:

Function	Hole(s)	Vertical Asymptote(s)	Horizontal Asymptote	x-intercept(s)	y-intercept
$y = \frac{1-x}{x+3}$					
$y = \frac{x-2}{x^2-4}$					
$y = \frac{x^2-x-20}{x+4}$					
$y = \frac{x^2-x-20}{x+1}$					
$y = \frac{2x^3}{x^3+x}$					
$y = \frac{x-1}{x^2-4}$					